

CLAIMS

What is Claimed is:

1                   1.       A refrigeration system having:  
2                   a closed fluid circuit serially including a screw compressor, a discharge  
3 line, a condenser, an expansion device, a chiller and a suction line leading back to said  
4 compressor;  
5                   water passing through said chiller in a heat exchange relationship and  
6 being cooled;  
7                   said compressor being unloaded solely by regulating the speed of said  
8 compressor;  
9                   motor means for driving said compressor;  
10                  means for varying the speed of said motor means by controlling the  
11 frequency of electrical current supplied to said motor;  
12                  means for providing cooling to said means for varying the speed;  
13                  means for sensing the temperature of water leaving said chiller;  
14                  means for controlling said means for varying the speed responsive to  
15 the sensed temperature of water leaving said chiller.

1                   2.       The refrigeration system of claim 1 wherein liquid refrigerant  
2 from said condenser is supplied by said means for providing cooling to said means for  
3 varying the speed of said motor.

1                   3.       The refrigeration system of claim 2 wherein liquid refrigerant  
2 used to provide cooling to said means for varying the speed is at least partially  
3 evaporated and supplied to said chiller.

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1                   4.     The refrigeration system of claim 1 wherein said means for  
2     controlling said means for varying the speed acts solely responsive to the sensed  
3     temperature of water leaving said chiller.

1                   5.     The refrigeration system of claim 1 wherein said means for  
2     varying the speed of said motor has a constant output over a range of frequency and  
3     voltage inputs.

1                   6.     A refrigeration system having:  
2                   a closed fluid circuit serially including a screw compressor, a discharge  
3     line,  
4     a condenser, a first expansion device, an economizer, a second expansion device, a  
5     chiller and a suction line leading back to said compressor;  
6                   a branch line connected to said economizer and extending into said  
7     compressor;  
8                   water passing through said chiller in a heat exchange relationship and  
9     being cooled;  
10                  said compressor being unloaded solely by regulating the speed of said  
11     compressor;  
12                  motor means for driving said compressor;  
13                  means for varying the speed of said motor means by controlling the  
14     frequency of electric current supplied to said motor;  
15                  means for providing cooling to said means for varying the speed;  
16                  means for sensing the temperature of water leaving said chiller;  
17                  means for controlling said means for varying the speed responsive to  
18     the sensed temperature of water leaving said chiller.

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1                   7.     The refrigeration system of claim 6 wherein liquid refrigerant  
2     from said condenser is supplied by said means for providing cooling to said means for  
3     varying the speed of said motor.

1                   8.     The refrigeration system of claim 6 wherein said means for  
2     varying the speed of said motor has a constant output over a range of frequency and  
3     voltage inputs.

1                   9.     A method for selecting the compressor, motor and variable  
2     speed drive for refrigeration system comprising the steps of:  
3                   for a given design refrigeration requirement, selecting a compressor  
4     having a design speed and being capable of providing the necessary refrigerant  
5     delivery;  
6                   selecting a motor operating at the compressor design speed with a  
7     power factor of at least 0.89 when delivering the design amount of refrigerant;  
8                   selecting a variable speed drive for controlling said motor by varying  
9     the frequency of electric power supplied to said motor such that said variable speed  
10    drive operates at an input power factor of at least 0.99 when driving said motor to  
11    drive said compressor to deliver the design amount of refrigerant.

1                   10.    The method of claim 9 wherein the step of selecting a  
2     compressor includes the selection of a compressor without mechanical unloading  
3     structure.

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